interesting, and promises that when fully installed it will be one of the most instructive gardens in the Western Hemisphere.

In a recent number of *Garden and Forest* (January 13), Professor Card makes a strong plea for experimental plant physiology as an adjunct to instruction in modern horticulture. It will repay reading by all botanists, and should encourage the introduction of physiological work in agricultural colleges, where it has generally been neglected, as well as in the larger universities where it has already had some recognition.

Professor Hitchcock's bulletin (62) on Corn Smut, issued by the Kansas Experiment Station, gives, in addition to much relating to structure and the germination of the spores, an extended synonymy and bibliography. He concludes, rather hastily, we think, that the name under which this smut be known is *Ustilago mays zeae* (DC) Magnus (= *Uredo segetum* var. *mays zeae* DC., Fl. Fr., II, 1805, = *Uredo maydis* DC. Fl. Fr., VI, 1815). De Candolle himself did not consider that he had sufficiently designated it in Vol. II of "Flora Francaise," since, in Vol. VI, he does not refer to his note in the earlier volume, but proceeds to describe it as a distinct species under the name *Uredo maydis.* We should not now compel De Candolle to say in 1805 what, ten years later, he himself felt that he had not said.

Another little book has appeared from the facile pen of Professor L. H. Bailey, which is, incidentally, of considerable interest to botanists, although primarily designed for gardeners. Under the title, "The Forcing Book" (The Macmillan Company), he tells much about greenhouse construction, heating and management, which will be most useful to those botanists who possess, or hope to build, a plant-house. The chapters on Lettuce, Cauliflower, Radishes, Tomatoes, Cucumbers, etc., are admirable illustrations of clear presentations, and will be valuable to botanists as well as gardeners.—CHARLES E. BESSEY.

ZOOLOGY.

Paramœba eilhardii.[1]—The amæboid organism to which Dr. Fr. Schaundinn gives this new specific and generic name was found by him in the salt-water aquarium of the Berlin Zoological Institute. Its life history was found to consist of three stages. (1) An amœboid stage, in which the organism measures from 10--90μ microns, is disc-

[1] S. B. K. Preuss. A. K , 1896, pp. 31–41 (12 figs.).

like, and is provided with blunt pseudopodia. In color it is often yellowish-brown, its plasma of a vacuolar honey-combed appearance, and its endoplasm with a large number of granules. Its central nucleus is vesicular and has an alveolar structure. Beside it is a peculiar refractive accessory body unlike anything found in other amœba. This, during the process of division, seems to divide before the nucleus.

(2) An encysted stage, in which the vacuolar appearance disappears, the pseudopodia become retracted, and a cyst-membrane is formed. The sequence of division is (a) the accessory body, (b) the nucleus, (c) the plasma.

(3) A flagellate stage that begins by the emergence from the cyst of oval swarm spores, each possessing two flagella, an ingestive aperture, two chromatophores, a nucleus, and, like the first stage, an accessory body. Leaving out of account this last body the organisms very closely resemble species of *Cryptomonas*. Sometime after emerging from the cyst the spores divide longitudinally, lose their chromatophores, and become amœboid.

Diplodal Sponge-Chambers.[2]—Prof. F. E. Schultz after a re-examination of the matter, using as examples, *Corticium candelabrum* O. Sch., *Chondrilla nucula* O. Sch., and *Oscarella lobularis*, confirms his observations made on the flagellate chambers of the last form in 1877. The chambers have both an entrant and an exit aperture.

The Asymetry of Spirorbis and the Phylogenetic Relationships of the Species of the Genus.[3]—As a result of the examination of a large number of specimens of this genus derived from various parts of the world, and comprising a score of species, it has been found that these serpulids are entirely asymetrical. The form of the spiral is constant for a given species, and is either dextral or sinestral. In the dextral species the operculum is always borne by the second right branchial, while in the sinestral forms it is borne on the left second branchial—thus, in all cases, on the concave side of the animal.

The muscle-fibers are developed to the greatest extent on the concave side.

The intestine and ovaries are crowded to the convex side.

The uncini are most numerous and largest on the concave side.

In the abdominal region there are, speaking generally, n rows of uncini on the right and $n + p$ rows on the left side ($p. = 2$–4).

[2] Zool. Anz., XIX (1896), pp. 426-32.

[3] M. Caulberg and Félix Mesnil. Comptes-Rendus, CXXIV (1897), pp. 48-50.

There are met with in a series of species, dextral as well as sinistral, on the concave side, a third group of uncini, representing a fourth thoracic setigerous ring that is lacking in others.

All this shows the influence of the spiral tube, and is explained by the movements of the animal. The functional activity of the organs of the concave side has preserved them, and is to be taken into account in any phylogenetic grouping.

Taking the direction of the spiral and the presence or absence of the thoracic ring into account, it is evident that the genus *Spirobis* may be divided into four subgenera, as follows:

Dextral species,	
With 3 thoracic rings . .	*Dexiospira.*
With 4 thoracic rings . . .	*Paradexiospira.*
Sinistral species,	
With 3 thoracic rings . .	*Lœospira.*
With 4 thoracic rings . .	*Paralœospira.*

The Malpighian Tubes of the Orthoptera.[4]—The malpighian tubes of the Orthoptera, as regards their number and length, present a great analogy with those of the Hymenoptera, but differ from them in their disposition and their mode of opening.

Among the divers excretory contents of these glands have been found in abundance: urate of sodium and urate of calcium in *Gryllus;* uric acid in *Gryllotalpa,* in the form of irregular spherical or ovoid concretions or of prismatic crystals; urate of sodium and uric acid in *Blatta* and *Periplaneta.*

Mr. Bordas' studies embraced some forty species of the principal families of Orthoptera, and result in the following conclusions:

In the Forficulidæ the tubes are few (8–10) and grouped into two opposite fascicles.

In the Phasmidæ they are very numerous, and united into 20–24 fascicles (in *Phibalosoma*), opening into an equal number of hemispherical or conical tubercles, which are short and are disposed in a circle around the intestine, of which they are simply evaginations. In *Acanthoderus* and *Necroscia* each collecting tubercle receives only two or three Malpighian tubes.

In the Mantidæ there are some 60–70 urinal tubes, opening sometimes irregularly, sometimes in groups of three to four (*Eremiaphila*). The praying mantis possesses 50–60, united into several bundles, separated by narrow free spaces.

[4] L. Bordas. Comptes-Rendus, CXXIV (1897), pp. 46–8.

In the *Periplanetæ* and *Blattæ* the tubes are grouped into six bundles, each with 15–20 tubes, opening at the summit of a very short conical tubercle. These six tubercles are simple evaginations of the intestinal wall, and are disposed in a circle about the intestine, at almost equal distances from one another. In *Polyzosteria* the tubes are filamentous, short, and likewise grouped into six bundles. In *Blabera* the mode of opening is characteristic, and very different from that in the rest of the Blattidæ. The tubes to the number of 50–60 are plain, embracing about a third of the intestinal circumference.

In the Acrididæ the number of tubes is very variable. Certain species (*Pœcilocerus* and *Pyrgomorpha*) have as many as a hundred, others (*Pamphagus*) have 60–70, others (*Œdopoda*) 70–80, others (*Psophus*, *Pachtylus*, etc.) 50–60. In all the tubes are grouped into a few bundles (5–6).

In the Locustidæ the number of tubes exceeds 100, grouped into six bundles, opening at the summit of 6 cylindro-conical tubercles, disposed sometimes regularly at equal distances from one another, sometimes irregularly, at the origin of the hind gut (*Locusta*, *Decticus*, *Salomona*, *Pseudorhynchus*, *Platicleis*, etc.). In the Ephippigerinæ one meets with three or four of these tubercles and some 110–120 urinary tubes. Finally, in *Gryllacris*, which in general have but a single, short collecting tubercle, there are some 80–100 Malpighian tubes.

In the Gryllidæ the number of tubes is great, and exceeds a hundred. In *Gryllus* and *Gryllotalpa* one finds 100–120. They open into a long unpaired cylindrical collecting tubule (ureter). This, after a course of 9 mm. to 12 mm., opens at the summit of a conical tubercle furnished with four valves limiting an asteriated orifice (*Gryllotalpa*).

Eels Feeding on the Eggs of Limulus.—In the latter part of May, four or five years ago, while walking at dusk along the Kickemuit River, which flows between the town of Warren and Bristol, R. I., I noticed many horse-feet crawling on the sandy bottom of the river. The tide was high, and they had come in from outside, as is their habit at high water. What attracted my attention the most was the fact that, as they lay there on the river bottom, many eels had worked their way into the clefts between their heads and abdominal regions, and were apparently feeding. Some of the eels were very large, and made a strange sight with their heads under the shell and their tails sticking out sideways. Sometimes two or three were under one horse-foot, and if I had had an eel spear I could have caught a good mess. I have since wondered what the eels were eating. Sometimes I think it might

have been something on which the horse-feet were feeding; but my uncle, who was with me, said that they were after the spawn; and I have since come to the conclusion that he was right, for it was the spawning season, and the eels were only gathered around the large female horse-feet. This spring I intend to make further observations, and find out if this is really the case. Horse-feet are used a little as a food for poultry on some farms in Bristol, and it was in cutting some of them open that I noticed that the large ones were the females, for they were full of eggs.—H. C. Warwell.

Elassoma zonatum East of the Apallachian Mountains.—In looking through the recently issued work by Drs. Jordan and Evermann, on the fishes of North and Middle America, I was reminded of having collected some years ago specimens of one of our smallest and least known fishes, in a locality that considerably extends its range as recorded by these authors. *Elassoma zonatum* is stated in the above mentioned work to occur from southern Illinois to Texas, Louisiana and Alabama. In 1882 the writer obtained specimens in Waccamaw River, near Whitesville, in southeastern North Carolina, and in the Little Pedee River in South Carolina. Evidently it was not at all rare where collected. My specimens were subsequently compared with material from southern Illinois in the collection of the Illinois State Laboratory of Natural History; and as Dr. Jordan had studied this collection in preparing his list of Illinois fishes, there can be no question about correctness of determination.

The number of scales in a longitudinal row along the side is not above 36, oftenest 34 or 35, and this is true also of Illinois specimens. The dorsal fin has 4 spines commonly, sometimes 5, and 10 soft rays, counting the posterior double ray as two. I believe that Dr. Jordan and his followers count this as a single ray, but its structure indicates that it is the equivalent of two ordinary rays. The anal fin has 3 spines and 6 soft rays, counting the double ray again as two. The branchiostegal rays are always 5 in number. In the description of the family Elassomidæ published by Drs. Jordan and Evermann the number of vertebræ is said to be 24 or 25, from which I judge the count was made from the Florida species, *E. evergladei*, which I have not seen, but in every specimen of *E. zonatum* examined by me the number is 29, including the mass which continues as the urostyle, of which 14 are precaudal. Illinois examples were not examined with reference to the vertebræ, but that they agree closely is shown by Dr. Jordan's own statement in the Bulletin of the Illinois State Laboratory (Vol. 1, No. 2,

p. 48, 1878), where the number is given as 28. My material was macerated and then examined with the microscope, and the count verified repeatedly on different specimens.

The colors of the Carolina fishes are the same as those of Illinois examples. The markings which at once catch the eye are a dusky bar below the eye and eleven narrow vertical bars on the side, two of those immediately behind the gill opening being enlarged to form a dusky spot. Three dusky dots at the bases of the caudal rays appear to be a constant character of young fishes.—H. GARMAN, Lexington, Ky.

The Human Tail.—According to Prof. W. Waldeyer,[5] who has recently gone over the subject, a tail is to be defined as a portion of the body that contains the caudal, *i. e.*, post-sacral, vertebræ and sundry other derivatives of caudal segments, all surrounded by integument. With reference to man, Virchow, in 1880, distinguished between tails with vertebræ and soft tails—a distinction generally recognized. As is well known the human embryo always shows evidence of a true vertebrated tail that may even persist after birth, yet in no case is it certain that more vertebral elements are present than are to be found in the normal coccyx. What occurs in tailed human subjects is the soft tail of Virchow, which corresponds to the distal non-vertebrated portion of the tail in other animals. In some cases this may be partly bony, but there is no increase in the number of caudal vertebræ.

ENTOMOLOGY.[1]

The Fauna of the Lower Rio Grande Valley.—Mr. H. F. Wickham publishes[2] an interesting paper on The Coleoptera of the Lower Rio Grande Valley, in which he discusses the faunal relations of the region as follows:

Regarding the true affinities of the Coleopterous fauna and the claim of the region to be considered tropical in its nature, opinions are more or less divided. Mr. Schwarz has stated that "no one can doubt the existence of a semi-tropical insect fauna along the north bank of the lower Rio Grande." Prof. Townsend classes the Brownsville fauna as Lower Sonoran, with a considerable touch of Austroriparian and about twenty-five per cent. tropical. Dr. Merriam has included it in his

[5] S. B. K. Preuss. Akad. Wiss., 1896, 775–84. J. R. M. S., 1896, p. 601.

[1] Edited by Clarence M. Weed, New Hampshire College, Durham, N. H.

[2] Bull. Lab. Nat. Hist., Univ. Iowa, IV, 96–115.